

EXECUTIVE SUMMARY

Introduction and Purpose

For nearly 100 years, the Los Angeles County Flood Control District (Flood Control District) has fulfilled its mission by providing flood risk management and water conservation for much of the County of Los Angeles. The Flood Control District manages a system of dams, reservoirs, debris basins, and other drainage infrastructure, which reduces the risk of floods and debris flows for downstream communities. In order to maintain the proper functionality of the facilities, sediment that accumulates in them needs to be removed.

In recent years, the Flood Control District has identified new challenges in managing sediment. In particular, recent wildfires have led to an increased inflow of sediment and debris within Flood Control District facilities that has put pressure on the remaining capacity of existing sediment placement sites, where the Flood Control District has traditionally placed sediment. As a result, the Flood Control District is pursuing new alternatives that can reduce the environmental and social impacts of sediment management.

The Sediment Management Strategic Plan (Strategic Plan) represents the results of a continuing dialogue about sediment management between the Flood Control District and numerous stakeholders in the region. The Strategic Plan provides an overview of sediment management issues, evaluates various alternatives to help identify optimal solutions for sediment management, and identifies general steps that should be pursued to meet the Flood Control District's mission. The Strategic Plan is guided by the following key objectives:

- Maintaining flood risk management and water conservation;
- Recognizing opportunities for increased environmental stewardship;
- Reducing social impacts related to sediment management;
- Identifying ways to use sediment as a resource;
- Ensuring the Flood Control District is fiscally responsible in decision-making.

The Strategic Plan balances these objectives with alternatives to address the Flood Control District's sediment management needs in order to provide for flood risk management and water conservation in a way that also considers the environment, communities, and the Flood Control District's budget.

The Strategic Plan is a living document that is open to other alternatives and may be revised in the future as conditions change. This Strategic Plan is intended to be an advisory document. The Strategic Plan will guide development of specific cleanout plans for the Flood Control District's numerous facilities. Development of those plans will provide opportunities for additional public input, including that from the local communities affected by each cleanout. Specific cleanout plans that will result in significant environmental impacts will also be subject to environmental review under the California Environmental Quality Act, which will provide additional opportunities for public involvement during project evaluation.

Meeting the Challenges of Sediment Management

Proper planning and maintenance of the flood control system is important for protecting public safety and the quality of life in local communities. Many factors must be accounted for to ensure the flood control system remains operational well into the future. The Strategic Plan provides a balanced approach by proactively addressing key issues affecting sediment management.

Following are the key issues and challenges addressed in the Strategic Plan:

A Project on a Massive Scale

The Flood Control District operates 14 reservoirs and 162 debris basins and is planning to manage 67.5 million cubic yards of sediment between 2012 and 2032. To put that into perspective, the Rose Bowl Stadium in Pasadena could hold approximately 400,000 cubic yards. Figure ES-1 shows the location and expected quantity of sediment for each reservoir and group of debris basins along with available capacity at existing Flood Control District sediment placement sites, which as of 2011 were estimated to have a total remaining capacity of approximately 48 million cubic yards. It is clear that space for additional sediment placement must be identified to meet the demands of the region. This Strategic Plan identifies opportunities beyond traditional placement at sediment placement sites, including placement at pits and landfills along with beneficial use of the sediment.

Maintaining Public Safety and Water Conservation

Flood Control District facilities address public safety by reducing flood risk. In addition, the dams and reservoirs are critical for water conservation and replenishment of local water resources. This Strategic Plan considers innovative solutions for sediment management while holding both public safety and water conservation as top priorities.

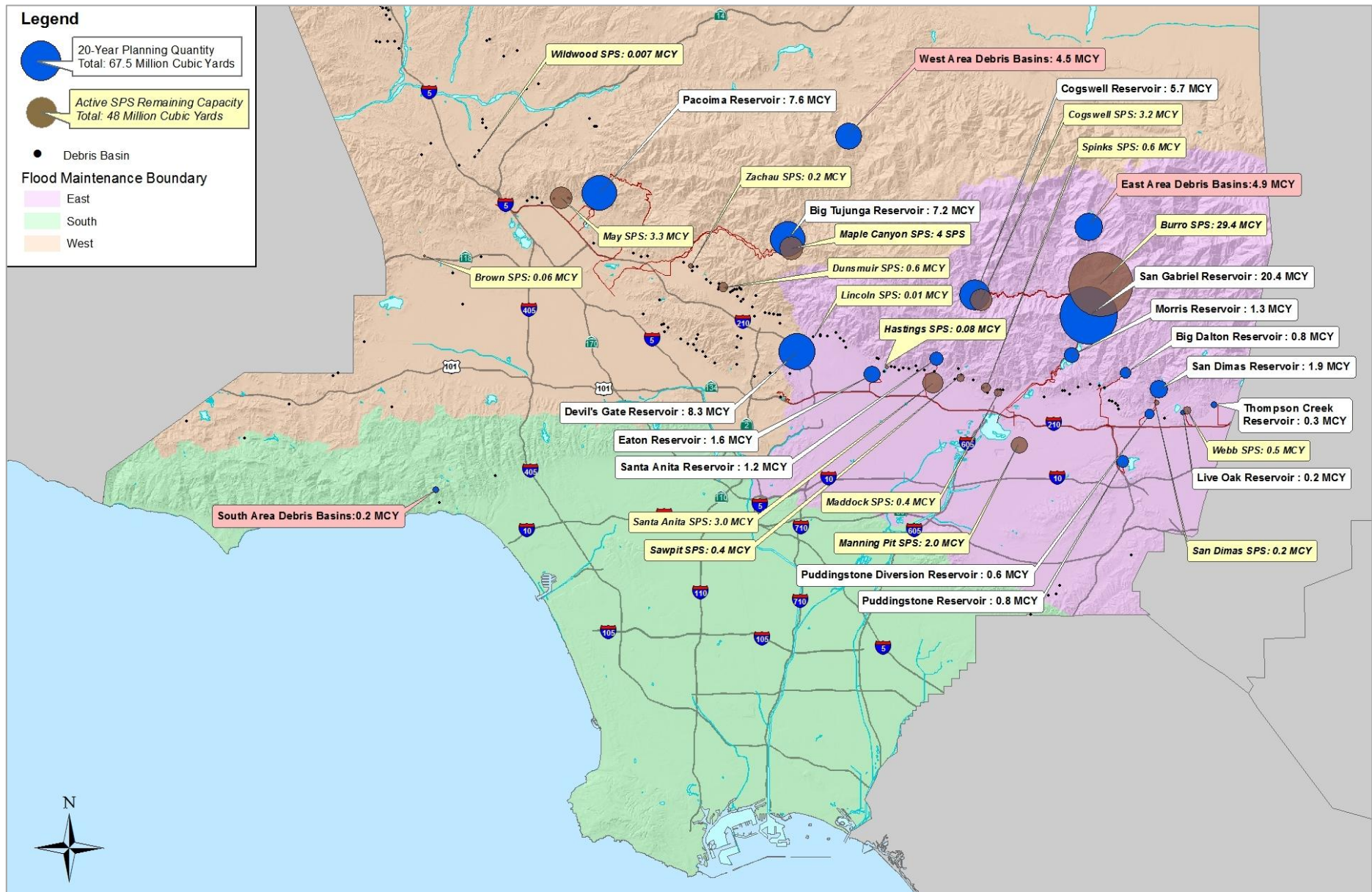
Limited Funding

While the Flood Control District's funding has been sufficient for previous sediment management projects, other operational needs must be taken into account when considering the cost and approach of the sediment management alternatives. Planning level costs are identified within the Strategic Plan and will be considered alongside the other benefits and impacts of the sediment management alternatives. Funding availability will need to be reevaluated as specific cleanout plans are developed.

Requirements for Project Partners

Some nontraditional alternatives considered in this Strategic Plan would require partnerships, especially where a portion of the benefits are outside of the Flood Control District's mission. In addition, efforts to investigate a long-term vision for the flood control system are being considered with the Army Corps of Engineers.

Figure ES- 1 20-Year Planning Quantities and Remaining Capacity at Sediment Placement Sites



Outreach Strategy

To ensure the Strategic Plan accurately reflects the input of the numerous stakeholders in the Los Angeles region, the Flood Control District engaged agency, industry, and public stakeholders to help shape the various sediment management alternatives under consideration. The tenets of the public outreach program included:

- **Stakeholder Task Force:** created to gather input from external stakeholders during the development and review of potential sediment management alternatives to be incorporated into the Strategic Plan. Regulatory agencies, cities, landfill owners and operators, water agencies, sand and gravel companies, environmental groups, and others were invited to participate in the Stakeholder Task Force. All Stakeholder Task Force meetings were open to the public.
- **Advisory Working Group:** created to gather additional input and a broad perspective from external stakeholders based on the members' diverse experiences and key roles in the stakeholder community. Participation included representatives from local jurisdictions, environmental groups, and the media.
- **Public Open Houses:** conducted to provide an open forum for public input during the Strategic Plan review period. Two open houses were held in the general vicinity of major facilities to allow neighboring community members to provide feedback on the alternatives identified in the Strategic Plan. *[NOTE: Two public meetings will occur during the review period of the document, comments received during the meetings will be incorporated into the final document.]*
- **Website:** developed a website (www.LASedimentManagement.com) dedicated to sediment management to provide ongoing information to the public on the development of the Strategic Plan and the planning of upcoming sediment removal projects.

Based on valuable input from agencies, organizations, industry, and the public through the Stakeholder Task Force, Advisory Working Group, and public open houses, the Flood Control District evaluated numerous sediment management alternatives. This input was used to develop the combined alternatives presented in this plan.

Evaluating the Alternatives

While considering input from stakeholders, the Flood Control District identified and analyzed various alternatives for sediment removal, transport, and placement. The alternatives were analyzed based on five main factors - environmental impacts, social impacts, implementability, performance, and approximate 20-year cost. A number of specific concerns were considered within each factor, as shown in Table ES-1.

Table ES-1 Evaluation Factors Considered for Each Sediment Management Alternative

Evaluation Factor	Description
Environmental Impacts	<ul style="list-style-type: none"> • Habitat • Water quality • Groundwater recharge • Air quality
Social Impacts	<ul style="list-style-type: none"> • Traffic • Scenic and visual impacts • Noise • Recreation
Implementability	<ul style="list-style-type: none"> • Construction issues • Permits or agreements
Performance	<ul style="list-style-type: none"> • Previous experience • Cleanout capacity • Number of operations required to address the planning quantity
Cost	<ul style="list-style-type: none"> • Estimated total cost over 20 years

Using the five factors, the Flood Control District analyzed each alternative to identify the feasibility for the three main facility types – large reservoirs, small reservoirs, and debris basins. The methods identified as feasible for each

facility type are included in Table ES-2. Removal, transport, and placement alternatives were put together as feasible for each reservoir and the debris basins to create combined sediment management alternatives.

Table ES-2 Feasible Sediment Management Alternatives

Alternative	Feasibility		
	Large Reservoirs	Small Reservoirs	Debris Basins
Removal			
Dry Excavation	✓	✓	✓
Dredging	✓		
Sluicing	✓		
Transportation			
Conveyor Belts	✓	✓	
Sluicing	✓		
Slurry Pipes	✓		
Trucks (including Low Emission Trucks)	✓	✓	✓
Placement			
Landfill Cover	✓	✓	✓
Fill for Pits	✓	✓	✓
Sediment Placement Sites	✓	✓	✓

During the analysis of alternatives, additional alternatives were considered, but eliminated based on feasibility. Table ES-3 details the alternatives identified as infeasible during the analysis and the reason(s) for elimination.

Table ES-3 Sediment Management Alternatives Considered, But Eliminated

Alternative	Reasons for Elimination
Removal	
Flow Assisted Sediment Transport	Flow Assisted Sediment Transport was not considered as a viable method of sediment removal because there is a high degree of uncertainty in regards to flow availability and impacts to downstream facilities and the environment. However, there is some support of this method if sediment can be introduced into releases from the reservoirs during storm events, which would mimic natural processes. Flow Assisted Sediment Transport will be studied further in coordination with stakeholders.
Transportation	
Trucking in Channels	Channels would need to be reconstructed since channels are not structurally designed to carry truck traffic. Bridge overcrossings would also need to be modified.
Rail	Travel distance is too short for rail to be cost-effective. Trucks would still be required from the reservoir/debris basin to the rail cars.
Two-way Saltwater Pipeline	Implementation and operations costs are very high. There would also be high environmental impact at coastal intake and discharge locations.
Cable-Bucket System	Permanent structures would have high visual impacts. Conveyor belts serve similar purpose, but have lower costs.
Placement	
Beach Nourishment	There is a high cost for transport and processing in addition to high social impacts. Other alternatives for beach replenishment are available at a lower cost and with fewer impacts.
Offshore Placement	Existing regulations do not allow if onshore alternatives are feasible.

The analysis of sediment management alternatives also identified several opportunities to use sediment as a resource. Sediment composition is a key determinant in the viability of use. The Flood Control District is committed to implementing strategies to encourage the use of sediment when economically viable and partnerships are available to facilitate preparing sediment for use.

Recommendations

Developing recommended sediment management alternatives for the 14 reservoirs and 162 debris basins the Flood Control District operates is a complex task. Each facility's unique geographic location provides both challenges and opportunities for sediment management and each alternative carries a series of tradeoffs.

For the small reservoirs and debris basins, fewer combined alternatives were feasible. For the larger facilities with a number of combined alternatives, more detailed analysis is warranted before making a determination on the future course of action. Therefore, it is recommended that multiple combined alternatives be considered for future sediment removal projects.

The complete analysis and recommendations for each reservoir and the debris basins are provided in the Strategic Plan in the following order:

- San Gabriel Canyon Reservoirs (Morris, San Gabriel, and Cogswell Reservoirs) – Section 7
- Other Large Reservoirs (Big Tujunga, Devil's Gate, Pacoima, Puddingstone, San Dimas, and Santa Anita Reservoirs) – Section 8
- Small Reservoirs (Big Dalton, Live Oak, Puddingstone Diversion, and Thompson Creek Reservoirs) – Section 9
- Debris Basins – Section 10.

Section 11 provides a summary of the sediment management alternatives and recommendations for all the reservoirs and debris basins along with the general steps that should be pursued in order to implement a sediment management approach based on the alternatives recommended by this Strategic Plan.

Next Steps

This Strategic Plan represents the first step in continued analysis and dialogue with our stakeholders to manage sediment at Flood Control District facilities in ways that consider the needs of all stakeholders. Several next steps have come out of the analysis included in this Strategic Plan.

- **Continue Analysis** – As a planning-level document, the Strategic Plan has identified feasible alternatives, but more analysis is needed prior to choosing a specific alternative for the larger, more complicated reservoirs. Specific analysis will clarify impacts and constraints, but may also identify new opportunities. One such alternative is Flow Assisted Sediment Transport, which shows promise as a methodology to move sediment downstream in a manner that mimics natural processes. As this analysis continues, the Flood Control District will work cooperatively with stakeholders.
- **Partner with Pit Operators/Acquire Pit(s)** – The Flood Control District will continue efforts to acquire the ability to place sediment at pits through service agreements or acquisition in both Sun Valley and the Irwindale area. If not completely filled, pits could be used to provide additional groundwater recharge. Also, the reclaimed land could be developed and integrated into the surrounding community, possibly providing open space or other needed amenities.
- **Beneficial Uses** – The Flood Control District will continue to explore beneficial use alternatives for both processing and placement, particularly where cost-sharing partnerships are available. Some of the sediment captured in Flood Control District facilities can be used as a resource and may have marketable value. The Flood Control District is also open to other alternatives, like beach replenishment, if project partners are available.
- **Long-Term Vision** – The Flood Control District will continue to work with the Army Corps of Engineers and local stakeholders to develop a regionwide plan to address sediment as a part of a comprehensive study of how to

restore the natural functions of the watershed while retaining the benefits provided by the current flood management system.

The Flood Control District has provided flood risk management and water conservation for almost 100 years. However, new challenges associated with sediment management have emerged. The Flood Control District is always open to hearing and discussing new ideas, so find out how to be involved at www.LASedimentManagement.com and share your ideas.